MILLENNIUM
PIPELINE

April 9, 2002

Margaret A. Crawford
U.S. Army Corps of Engineers
7413 County House Road
Auburn, New York 13021

Re: Millennium Pipeline Project:
Department of the Army
Application Nos. 97-320-0003(2),
1999-00640, 199701186

Dear Ms. Crawford:

Millennium Pipeline Company, L.P. ("Millennium") has received your March 18, 2002 requesting further information regarding Millennium's applications for Section 10 and 404 permits. The requested information is provided below:

Wetland Mitigation Plan

Enclosed is a complete wetland mitigation plan that incorporates the details requested in your letter and all your and Heidi Firstencel's comments from our conference calls. As you indicated in our last conversation, this conceptual plan is now complete. The April 2, 2002 comments from the New York Dept. of Environmental Conservation will be addressed in the proposed detailed wetland mitigation plan discussed below.

Sidecasting in Haverstraw Bay

Your letter notes that the law firm of Kirkland & Ellis has advised the New York State Department of State ("DOS") that Millennium may need to sidecast materials on the bottom of the Hudson River. Contrary to Kirkland & Ellis' conjecture, no excavated material will be sidecast on the riverbed. As Millennium explained in its March 14, 2002 letter to the DOS, Kirkland & Ellis speculated that lay barges would be used to store excavated materials but might be unable to access the shallow water area near the eastern shoreline of the river, particularly during low tide, thus requiring Millennium to sidecast the excavated material on the riverbed. In fact, however, Millennium has never proposed to store excavated material on lay barges, which will be used solely to lay the pipeline. Instead, Millennium will store the excavated material in separate shallow water storage barges, which will be positioned in the portion of the trench that has already been excavated, thus ensuring adequate draft depth. Any excavated material that cannot be stored in the shallow water barges will be stored on the shore. To repeat, no excavated material will be sidecast on the riverbed. A copy of Millennium's March 14, 2002 letter to the DOS is enclosed.

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Bog Turtle Habitat

As you requested in your letter, revised detailed construction sheets for the pipeline construction in the vicinity of Wetland No. 9 (Millennium wetland # W621) have been forwarded to Ms. Heidi Firstencel of the Albany Field Office as well as to Mr. Alex Chmielewski of the Fish and Wildlife Service of the Department of the Interior ("FWS"). A copy of the transmittal letter is attached. This information will allow the FWS to verify that bog turtle habitat will be avoided and to conclude its endangered species consultation. These drawings should not be disclosed to the public as they disclose the location of an endangered species.

Hudson River

Your letter states that the FWS has requested "a more thorough evaluation of the environmental consequences of the Hudson River North Alternative 1 as described in Section 6.0 of . . . the Final Environmental Impact Statement ("FEIS") for the project" that was issued by the Federal Energy Regulatory Commission ("FERC"). When the FWS requested that very same information from the FERC, the FERC properly responded as follows (FEIS, Volume 2, Appendix P, at 56 (emphasis added)):

> "The Hudson River North Alternatives are **not feasible** because of existing utility and industrial development on both banks of the river at the alternate crossing location and the lack of other viable staging areas in the vicinity . . . . Without a feasible crossing location, **these alternatives cannot be used**."

Elsewhere in the FEIS, the FERC explains in detail that the Hudson River North Alternative 1 is not feasible from a construction standpoint. FEIS at 6-4, 6-5. Since the Hudson River North Alternative 1 is "not feasible" and "cannot be used," Millennium respectfully submits that a "more thorough evaluation" of its "environmental consequences" would serve no purpose.

The FWS has also commented that a so-called "one-pipe" alternative that would avoid a Hudson River crossing should be developed. In the DEIS, the SDEIS, and the FEIS, the FERC repeatedly and thoroughly explored an array of such potential alternatives, including the Eastchester Expansion System Alternative, the Algonquin/Iroquois Pipeline System Alternative, and the use of the existing Tennessee or Transco pipeline systems. In each case, however, the FERC found that the alternatives would either have far greater environmental impacts or could not feasibly be implemented. FEIS §§ 3.2.7 and 3.2.8. Millennium submits that these reasoned findings by the lead federal agency that is responsible for making interstate pipeline routing decisions are entitled to deference by the Corps in its role as the cooperating federal agency in the preparation of the FEIS.

Your letter also requests "any other information you might provide that would assist us in determining that the proposed Haverstraw Bay crossing would be the least environmentally damaging practical alternative." In response, Millennium would note (1) that the Corps was a cooperating agency in the preparation of the FEIS, which reasonably concludes that the proposed crossing is the one and only "practical alternative"; (2) that the FERC approved the proposed Hudson River crossing in its order issued on December 19, 2001 (*Millennium Pipeline Co., L.P.*, 97 FERC ¶ 61,292 (2001)), in which it reconfirmed that "none of the . . . route alternatives were reasonable or practical" (97 FERC at 62,342-

43); (3) that the New York Department of Environmental Conservation has issued a Section 401 water quality certificate that authorizes Millennium to undertake the proposed Hudson River crossing; and (4) that the National Marine Fisheries Service has issued a biological opinion under the Endangered Species Act which concludes that the proposed crossing would not jeopardize the shortnose sturgeon and an incidental take statement which has reasonable and prudent measures, terms, and conditions to minimize impacts to the sturgeon.

Millennium has advised the Corps that it may be necessary to employ blasting to excavate the trench for approximately 200 feet of the Hudson River crossing near the eastern shoreline. The FWS "acknowledges that the proposed mitigation measures would reduce the potential negative impacts," but nevertheless "recommends that Millennium assess the possibility of installing portable cofferdams and pumping the water from the area to be trenched, removing and stockpiling unconsolidated materials, and using a rocsaw to dig the trench." Millennium believes that the blasting "in the dry" method suggested by the FWS would cause substantially greater adverse environmental impacts than the method proposed by Millennium. First, Millennium believes that the use of a cofferdam at this location would be extremely dangerous as it would expose the workforce to a completely unnecessary, life-threatening risk should the cofferdam fail. Second, although not investigated on-site, it is highly likely that the soft sediments would not allow construction of a stable cofferdam. These sediments would have to be removed from a large area and non-native earthen material deposited to enhance the stability of the cofferdam structure. This would require a significantly larger construction area than currently proposed and take significantly longer than the current window allows. Third, Millennium does not believe that the pipe could be independently installed in this short section, as there would be no way to tie it in to the balance of the crossing. Finally, excavation by a rocsaw would not be possible, as the equipment could not access this area. Blasting inside a temporary cofferdam would risk collapse of the structure. Rock excavation would likely be reduced to hydraulic hammers, again extending the construction period well beyond the established window for this crossing.

Lake Erie

You have also asked Millennium to respond to concerns expressed by the FWS regarding the Lake Erie crossing. In that regard, you acknowledge that "[t]hese issues have been addressed throughout the environmental review, and a summary of how these concerns have been resolved should satisfy these concerns." With that understanding in mind, each of those issues is addressed below.

Effects of Pipeline Failure on Aquatic Organisms

The FWS's principal Lake Erie concern -- that a pipeline failure could result in fish and aquatic invertebrate mortality -- rests on several fundamental misconceptions:

1. The FWS reasons that "[b]ecause the depth that the pipeline would be buried was determined by the 100-year ice scour depth, there is a 20% chance that the pipeline would be damaged at some point during its 20-year life." That is untrue. As the FEIS states, Millennium's pipeline has been designed "to withstand the forces from an ice scour expected once in 100 years." FEIS at 5-46. Indeed, as the Corps noted in its extensive study of the Lake Erie crossing, the design of the pipeline even includes a substantial "margin of safety" between the maximum tensile strain caused by the deepest ice scour expected in 100 years and the strain needed to rupture the pipeline. ERDC/CRREL Report TR-00-13 (August 2000), at vii.

2. Because Millennium proposes to lay its pipeline in an open trench across Lake Erie that will backfill naturally over a period of years, the FWS infers that "the pipeline would not be fully protected until the trench is filled" and that "the pipeline may be vulnerable to scour for some longer period of time." In fact, however, not backfilling the trench will make the pipeline less vulnerable to scour. As the Corps' Lake Erie study recognizes, the potential damage to the pipeline from an ice scour would be caused by the force of the soil driven up against the pipe by the scour, and thus an open trench or a trench backfilled naturally with poorly compacted soil would reduce the likelihood of any damage. ERDC/CRREL Report, at 26-27.

3. The FWS speculates that "[t]he risk of failure in Lake Erie may be greater than average because that portion of the pipeline under the lake would only be inspected every 3 years as opposed to annual inspections in populated areas." But Millennium's pipeline will be monitored continuously, on a 24/7 basis, to detect pressure drops that might indicate a leak or failure (FEIS Volume 2, at 0-4) and will not be subject to the third party damage or corrosion that cause most pipeline accidents. Given the pipeline's state-of-the-art design that will permit it to withstand even a 100-year ice scour, there is little or no risk of a pipeline failure.

Even in the remote event of a pipeline failure, the impacts to aquatic organisms envisioned by the FWS would not occur. While the FWS cites evidence (Patin, 1999) that methane intoxication from a major gas well blowout in the Sea of Asov adversely affected fish directly exposed to the flowing gas for 4 to 5 days, the volume of gas released from the Millennium pipeline in the event of a leak or failure would be de minimis by comparison, since Millennium would immediately close the shutdown valves on both sides of the lake to terminate the flow of gas. It could take more time to repair a leak or rupture of the pipeline across the lake, as the FWS states, but there would be no flow of gas that might affect fish until the repairs were completed.

Recapture of Drilling Fluids

Contrary to the FWS's assertion, Millennium has not stated that the recovery of the drilling fluids released during the directional drill of the nearshore area of Lake Erie is "unnecessary." Instead, Millennium has properly stated that the collection of the drilling fluids from the bottom of the lake would be "impractical." FEIS at 5-41. The drilling fluids will consist of a mixture of 2,000 cubic yards of excavated material, 4,000 cubic yards of bentonite, and 24.2 million gallons of water. While the FWS states that "Millennium should be required to recapture drilling muds before they are released into the water column," there is no commercial technology that would permit that to be accomplished. The release of the drilling fluids is a necessary result of the directional drilling process, which is environmentally preferable to an open-cut crossing of the nearshore area. However, Millennium will minimize the volume of mud used during the drilling process by recirculating and reusing it to the maximum extent practicable. As part of the recirculation process, the drilling mud is allowed to settle in an on-shore pit to separate the bore hole cuttings before the mud is reused. Further, although drilling mud will be released into the water column once the lake bottom is penetrated, such releases have already been addressed by the New York Dept. of Environmental Conservation in its Section 401 Water Quality Certificate. As a result, it is Millennium's opinion that the drilling muds are not regulated under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act.

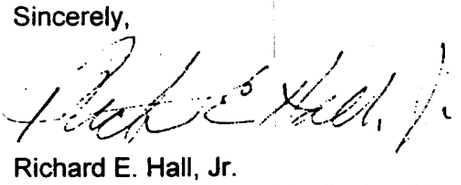
Alternative Routes

The FEIS devotes more than 15 pages to an analysis of potential alternatives to the proposed Lake Erie crossing. FEIS Volume 1, §§ 3.2.4 and 3.3.1. In summary, the FERC found that the alternatives entailed (a) longer routes, which generally have greater environmental impacts, (b) land-based routes, which would have more adverse effects on private property, agricultural areas, and sensitive resources such as wetlands, forest, streams, water supplies, cultural resources, roads, parks, and recreational areas, and (c) greater construction costs, which would increase energy costs and impair project economics.

Conclusion

Millennium submits that it has adequately responded to your March 18, 2002 letter and to the issues raised by the FWS. We therefore respectfully request the Corps to promptly issue the requested permits.

Sincerely,



Richard E. Hall, Jr.
Millennium Acting Facility Project Manager

Cc H. Firstencel
G. Nieves
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MILLENNIUM PIPELINE PROJECT

CONCEPTUAL WETLAND AND WATERWAY MITIGATION PROPOSAL

INTRODUCTION

This will serve as the response of Millennium Pipeline Company, L.P. (Millennium) to the U.S. Army Corps of Engineers (COE) request for a conceptual wetland and waterway mitigation plan. As discussed in Millennium's previous replies to the COE, Millennium agrees that the mitigation components required by the COE in its March 18, 2002 letter are reasonable, in particular if the acreage is based upon that actually affected by construction and maintenance. Those components are:

a) forested wetland acquisition at a minimum of 2:1 ratio for all forested wetlands that would be impacted (i.e., permanent loss of covertype)
b) forested wetland restoration at a minimum of 1:1 ratio for all forested wetlands that would be impacted (i.e., permanent loss of covertype)
c) various research projects (e.g., tussock sedge crossings, brush mats within wetlands, etc.)
d) stream mitigation (e.g., restoration, enhancement, monitoring, etc.)

Millennium agrees to comply with these mitigation components and will ensure that at least half of the required mitigation acreage is in the Buffalo COE District and half is in the black dirt region of the New York COE District. Millennium proposes to mitigate wetland and waterway impacts through a comprehensive program of on-site restoration of affected wetlands and waterways, purchase of off-site properties for the purpose of permanently protecting mature forested wetlands and waterways, creation of off-site forested wetlands, and funding research specific to pipeline construction activities. On-site restoration of wetlands and waterways affected by construction will be accomplished through implementation of measures contained in Millennium's Environmental Construction Standards (ECS). A copy of Millennium's ECS is attached. Millennium proposes to mitigate off-site for the proposed permanent impacts to forested wetlands by purchasing property that includes forested wetlands at two locations, one in Cattaraugus County and one in Orange County. Millennium will also create off-site forested wetlands to replace those which will be permanently cleared as part of right-of-way (ROW) maintenance. Wetland creation activities will occur at the same sites in Cattaraugus County and Orange County NY. All of these properties will be transferred to the State of New York for incorporation into the state's system of public lands or deeded (with appropriate conservation restrictions) to a land conservation organization such as the Orange County Land Trust. Millennium also proposes to fund research projects associated with pipeline construction through waters of the United States.

AFFECTED WETLANDS

The information supplied to the COE pertaining to wetland impacts has been based on the preliminary survey of the proposed route conducted primarily in 1997. This has been revised, as necessary, to reflect subsequent changes in the proposed route and to reflect the results of additional field visits to locations where permission to survey had not been obtained at the time of the preliminary survey. Based on the information obtained to date, Millennium believes that the project will affect approximately 99 acres of forested wetland. Of this total, 72 acres lie within the temporary work area for the Project. This acreage will be restored following construction and allowed to revert to forested wetland. The remaining 27 acres of forested wetland lie within the 50-foot permanent ROW for the project. However, a portion of this acreage will also be restored and allowed to revert to forested wetland as a result of Millennium's agreement to limit ROW maintenance to a 30-foot width within forested wetlands. As a result of this maintenance limitation, Millennium has determined that approximately 16 acres of forested wetland will lie within the 30-foot maintained ROW with the remaining 11 acres of forested wetland within the permanent ROW for the project being restored and allowed to revert to forested wetland. To summarize, the Project will affect approximately 99 acres of forested wetland, of which 83 acres will be restored and 16 acres will be permanently converted to scrub-shrub and/or emergent wetland.

In Millennium's *Third Party Environmental Compliance Management Program*, Millennium has committed to fully identifying and delineating all wetlands within the final construction work area for the project just prior to construction. As Millennium has stated throughout the permitting process, the estimates of wetland impacts have been conservative and Millennium believes that the final wetland delineations will result in a lowering of the total wetland impacts for the project. However, as indicated below, the mitigation being proposed vastly exceeds the mitigation suggested in your correspondence. Thus, Millennium believes that the proposed mitigation will be more than adequate regardless of the outcome of the wetland delineations to be subsequently conducted.

The mitigation ratio required in your March 18, 2002 letter is a 1:1 acreage replacement of mature wooded wetlands (wetland restoration/creation) and 2:1 acreage acquisition and permanent protection of mature wooded wetlands to compensate for forested wetland acreage that will experience permanent change in cover type. As indicated above, Millennium estimates that approximately 16 acres of forested wetlands will be permanently converted to other wetland cover types by construction and maintenance of the project. Therefore, it is required that Millennium create a minimum of 16 acres and acquire a minimum of 32 acres in order to fulfill these requirements.

DESCRIPTION OF PROJECT WETLAND MITIGATION

Forested Wetland Acquisition

The following is a description of each of the properties that Millennium plans to purchase.

Cattaraugus County. Millennium has been in consultation with the New York State Dept. of Environmental Conservation (NYSDEC, Mr. Joe Galati, Region 9) and identified a large parcel of land, approximately 495 acres, which includes a diverse mix of wetland and upland habitat. This parcel is in the Conewango Creek valley in the vicinity of the State Drainage Ditch (attached MPL Drawing No. 8525-GIS-5636). NYSDEC has been active in purchasing properties in this area to preserve open space and wetland assets. Thus, this property is strategically situated near other State owned and managed property and would be an extremely valuable environmental asset to New York State. Based on examination of National Wetland Inventory (NWI) mapping of this area, the Cattaraugus County parcel contains approximately 190 acres of forested wetland, 2 acres of forested and scrub-shrub wetland, 26 acres of emergent wetland, 2 acres of open water wetland, and 276 acres of upland. The landowner's name and phone number are available upon request.

Orange County. Millennium has also identified a large property of approximately 197 acres in Orange County that may be suitable for preservation (attached MPL Drawing No. 8525-GIS-5638). It contains a mature forested wetland and is subject to pressure for agricultural conversion. It should also be noted that this property has been studied by Dr. Eric Karlin, Professor of Plant Ecology at Ramapo College. Dr. Karlin characterizes this property as "the only known remnant of what was once one of the largest inland Atlantic white cedar peat swamp complexes in the world." (Karlin 1997, copy attached). Acquisition and preservation of this property would obviously contribute significantly to the local heritage and help preserve a valuable and now critically imperiled ecosystem. Based on examination of NWI mapping of this area, the Orange County parcel contains approximately 161 acres of forested wetland, 27 acres of emergent and forested wetland, and 9 acres of emergent wetland. Even though these areas are mapped as wetland, the NWI maps are not always accurate in this area. Field reconnaissance indicates that sufficient acreage is available for creation activities at this site. In addition, other sites in the vicinity are available. The landowner's name and phone number for the primary site are available upon request.

As stated previously, based on preliminary discussions, the landowners are willing sellers; however, if an agreement cannot be reached between Millennium and each landowner, suitable alternative properties can and will be found. After purchase, Millennium would ultimately transfer the properties to New York State to be incorporated into the state's system of public lands or a suitable conservation group (i.e. Orange County Land Trust) to be preserved.

Millennium has not conducted field visits to either property but will do so once these

conceptual wetland mitigation plans are approved by the COE for the purposes of providing a detailed identification and categorization of the environmental assets contained in these properties. However, based on descriptions of these properties obtained during preliminary discussions with NYSDEC and review of the NWI mapping, Millennium believes that the amount of forested wetland acreage that will be purchased within these two properties is approximately 350 acres. This is more than ten times greater than the necessary 32 acres that would be required to mitigate for the 16 acres of forested wetlands to be permanently converted to other wetland cover types under the 2:1 mitigation ratio proposed by COE. Acquisition of these properties would also result in the preservation of over 10,900 feet of streams as well. Millennium will complete the acquisition of any properties included in the wetland and waterway mitigation plan prior to commencement of construction activities.

Forested Wetland Creation

The following is a description of each of the properties in which Millennium plans to create wetlands.

Cattaraugus County. The property identified above for acquisition also has excellent wetland creation opportunities. Millennium has been in consultation with Mr. Joe Galati, NYSDEC Region 9 and confirmed that approximately 25 acres of this parcel can readily be converted to wetland. As indicated in Mr. Galati's attached e-mail dated March 4, 2002, Millennium will arrange to plug the drainage ditches to flood areas suitable for forested wetland habitat. These areas will be planted with woody species using the forested wetland restoration procedures specified in Millennium's ECS.

Orange County. The property identified above for acquisition also has several wetland creation opportunities. Millennium has been in consultation with Ms. Ann Botshon, Wallkill River Task Force, Mr. John Gebhards, Orange County Land Trust, and Dr. Eric Karlin, Professor of Plant Ecology at Ramapo College and confirmed that wetland restoration and creation opportunities exist on this property. Other opportunities also exist in the vicinity as described in Ms. Botshon's March 12, 2002 letter (copy attached).

As part of the wetland creation package, Millennium will also sponsor a monitoring program to track the development of these wetlands. Inspections, along with appropriate reports will be performed at year 1, 2, 5, 7 and 10 after the wetlands are created.

Wetland Construction and Maintenance Practices

In addition to the creation and acquisition of forested wetlands, Millennium will also pursue on-site restoration measures within the construction work area, such as replanting the non-maintained portions of forested wetlands, reducing maintenance within 35 feet of streams, and monitoring of wetland/stream crossings. These measures will be implemented as fully detailed in Millennium's ECS, which the FERC has required Millennium to follow. These include limiting disturbance to the area needed for safe and

efficient equipment operation, no grading or removal of stumps or root systems from the rest of the construction work area unless determined that safety-related construction constraints require removal from under the working side of the construction work area, topsoil conservation and restoration of original contours, and implementation of erosion and sedimentation controls to prevent sediment runoff. On-site restoration measures for forested wetlands include planting native trees to restore the construction work area except for the maintained portion of the permanent ROW, planting native shrub and herbaceous species to revegetate the 30-foot wide portion of the permanent ROW selectively maintained as described in Section VI.C. of the ECS; and consulting with the U.S. Fish and Wildlife Service, the Environmental Protection Agency, the COE and the NYSDEC to determine the density for planting the native trees and shrubs. All of the wetland construction and maintenance measures will be fully specified in the final detailed Wetland and Waterway Mitigation Plan.

Research and Monitoring Programs

As further mitigation, Millennium plans to conduct research into the effects of sedge tussock removal and restoration, use of mats over existing wetland shrub vegetation, and documentation of actual down current turbidity plumes in Lake Erie and the Hudson River versus the models used for estimating these impacts.

Restoration of Sedge Tussocks. COE has expressed concern pertaining to project impacts on sedge tussocks within a few selected wetlands. Sedge tussocks occur within wetlands W292b in Chemung County, Wetland W227 in Steuben County and W536 in Sullivan County. Additional locations may be added to this program if sedge tussocks are found to constitute an important portion of the existing vegetation. Millennium has proposed to remove the tussocks, store them under appropriate conditions, and reposition them within the construction work area during ROW restoration. Millennium will monitor the success of this restoration effort following construction.

Millennium proposes to monitor the substrate, number of shoots, length of shoots, tussock dimensions, and general appearance of these tussocks for a period of 3 years. The wetland expert responsible for conducting the research will be hired prior to the commencement of construction activities and will be present on-site during construction to monitor removal, storage, and replanting of the tussocks to ensure that the procedures used will maximize the survival and subsequent growth of this vegetation. Millennium believes that a qualified faculty member of a New York university or college can conduct this program. Tussocks will be tagged prior to removal. Data will be collected on the initial condition of the tussocks. Following restoration of the construction work area, the condition of the tussocks will be assessed 3 months after restoration and then at least twice yearly during the growing season for the 3 following years. Millennium believes that this length of monitoring should be sufficient to determine the success of this removal and repositioning effort. If the tussock replanting effort is a failure such that all individual tussocks die, Millennium will endeavor to determine the reason for the failure and include this information in the final report.

Progress reports on the monitoring program will be submitted to COE, NYSDEC and other interested agencies and parties following each data collection. A final report will be prepared and submitted following completion of the monitoring program.

Use of Construction Mats over Existing Vegetation. During discussions with COE and NYSDEC, Millennium has agreed to attempt to limit removal of shrub vegetation in a number of wetlands. Pruning large shrubs, as necessary, and then placing the construction matting directly over the affected shrubs, will achieve this. The consensus among the agency personnel is that the adverse effects of this process on shrubs will not be as pronounced as the effects of removal and replanting.

Millennium will evaluate the success of this effort by monitoring survival and subsequent growth of affected shrubs within wetlands W227 in Steuben County and W292b in Chemung County. Following restoration of the construction work area, the condition of the shrubs will be assessed 3 months and 6 months after restoration and then yearly during mid-summer for the 3 following years. The wetland expert responsible for conducting the research will be hired prior to the commencement of construction activities and will be present on-site during construction to monitor the pruning and matting of shrubs. Millennium believes that a qualified faculty member of a New York university or college can conduct this program. Data will collected pertaining to the survival of the shrubs and the subsequent growth rates following restoration. Millennium believes that this length of monitoring should be sufficient to determine the success of this effort. Progress reports on the monitoring program will be submitted to COE, NYSDEC and other interested agencies and parties following each data collection. A final report will be prepared and submitted following completion of the monitoring program.

DESCRIPTION OF PROJECT WATERWAY MITIGATION

Stream and Waterway Acquisition

The following is a description of each of the properties that Millennium plans to purchase and preserve. This preservation would assist in addressing requirement "d" of the COE's recommended mitigation list.

Cattaraugus County. The property identified above for acquisition also has excellent opportunities for stream preservation. Millennium has reviewed the USGS Topographic Quadrangles and determined that about 7,700 feet of tributaries to Conewango Creek and the State Drainage Ditch are within this property. Since this parcel is in the Conewango Creek valley and is strategically situated near other State owned and managed property, it would be an extremely valuable environmental asset to New York State. Preservation of this property would result in an extremely large, continuous, preserved area within the watershed and thus significantly assist in maintaining the overall water quality in this drainage.

Orange County. The property identified above for acquisition also has an opportunity to preserve waterways. Preservation of this property would result in preserving about 3,200 feet of Coleman Ditch, however wetland creation efforts may affect the final stream preservation total.

As stated previously, after purchase Millennium would ultimately transfer the properties to New York State and incorporated into the state's system of public lands or a suitable conservation group (i.e. Orange County Land Trust) to be preserved.

Monitoring of Lake Erie and Hudson River Construction. As discussed with the COE, this component of the mitigation plan addresses requirement "d" as well. The objective of this sampling plan is to monitor water quality and sedimentation during the Haverstraw Bay and Lake Erie dredging and pipelaying operations and verify that the effects predicted by the water quality and sedimentation modeling were accurately predicted. Water quality will be monitored at multiple upstream and downstream locations during both dredging and backfilling operations. Monitoring will be more intense during initial operations until sufficient data are collected to verify that the effects on water quality are within the limits predicted by the model results. Water quality monitoring will continue at reduced intensity for the duration of the pipelaying operation to assure that water quality effects are minimized. Bottom profiles will also be measured before and after pipelaying to assess changes in sediment levels in the dredge area and adjacent areas. Raw data will be made available to NYSDEC and Pennsylvania Department of Environmental Protection, in the case of Lake Erie, within 24 hours of availability from the laboratory and reports analyzing the monitoring results will be submitted weekly.

Once construction is complete, we will compare and contrast the actual field data with those predicted by the COE DREDGE model for the Project. A report will then be prepared that will provide a critical analysis of the model results and, if appropriate, provide recommendations for improving the DREDGE model.

Stream Construction and Maintenance Practices

In addition to the acquisition and preservation of streams and waterways (waterways), Millennium will also pursue on-site restoration measures within the construction work area, such as replanting the non-maintained portions of waterway buffer strips, reducing maintenance within 35 feet of stream waterways, and monitoring of waterway crossings. These measures will be implemented as fully detailed in Millennium's ECS, which the FERC has required Millennium to follow. These include limiting grading until just prior to the crossing, restoration of original contours, and implementation of erosion and sedimentation controls to prevent sediment runoff. On-site restoration measures for waterways include planting native trees to restore the construction work area except for the maintained portion of the permanent ROW, planting native shrub and herbaceous species to revegetate the 30-foot wide portion of the permanent ROW selectively maintained as described in Section VI.C. of the ECS; and consulting with the U.S. Fish and Wildlife Service, the Environmental Protection Agency, the COE and the NYSDEC

to determine the density for planting the native trees and shrubs. All of the waterway construction and maintenance measures will be fully specified in the final detailed Wetland and Waterway Mitigation Plan.

SUMMARY

Millennium agrees to perform the mitigation identified above in conjunction with the construction of the project. Millennium will prepare and submit a detailed mitigation plan after the COE's issuance of the Individual Permit for the project and well before commencement of construction. The detailed mitigation plan will include a baseline description of affected wetlands, identification of properties to be acquired for mitigation of forested wetland and waterway impacts, a detailed description of forested wetland creation procedures, a description of the assets contained in those properties, a detailed description of the sedge tussock and shrub monitoring programs, a description of the goals of the restoration program for the construction work area, a description of the restoration program for the construction work area, a monitoring plan for the restoration and creation program, a description of the success criteria for the restoration program, a contingency plan, a site protection plan, financial assurances, and identification of the responsible party for long-term maintenance.

March 4, 2002 e-mail from Mr. Joseph Galati – NYSDEC Region 9

Rick

The Conewango/Randolph Swamp area that the Department has proposed for a consolidated mitigation for the Millennium project is a high priority area targeted by our Open Space Plan for acquisition and management. The two parcels are owned by Millard Young and Hazel Kellner. The parcels are predominantly deciduous wetland with interspersed openings of prior converted agriculture lands totaling approximately 500 acres. This area would be incorporated into the 960 acres the state already owns. By plugging Ag ditches within the parcel, approximately 25 acres of emergent/forested wetland could be created or restored. All impacts of the ditch plugging would be confined within the acquired parcels.

The area is presently an important waterfowl nesting area and is also managed for reptiles, amphibians, osprey and bald eagle. Acquisition of this parcel will greatly improve protection of the habitats for the above species and insure protection from future development. If you need any further information, please let me know.

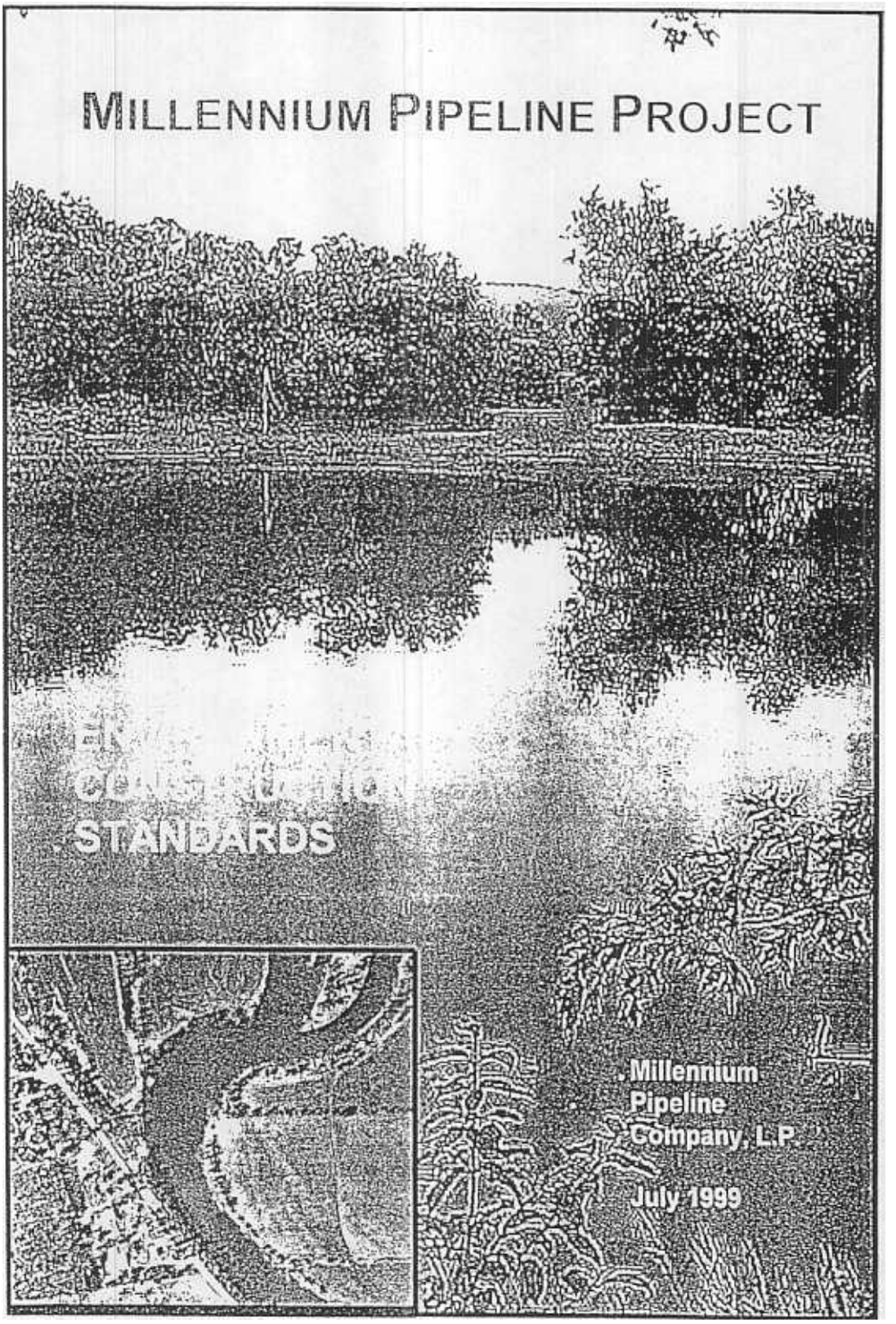
Joseph Galati
Habitat Protection Biologist
NYS DEC
182 East Union, Suite 3
Allegany, NY 14706
716-372-0645

MILLENNIUM PIPELINE PROJECT

CONCEPTUAL WETLAND AND WATERWAY MITIGATION PROPOSAL

Wetland maps 8525-GIS-5636 and 8525-GIS-5638 are not attached to this package. Please call Rick Hall, Jr (607.648.1116) if you would like a copy of these maps.

[PREVIOUSLY PROVIDED



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The Drowned Lands' last stand: An inland Atlantic white cedar peat swamp in Orange County, New York

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KARLIN, E. F. (School of Theoretical and Applied Science, Ramapo College, Mahwah, NJ 07430). The Drowned Lands' last stand: An inland Atlantic White cedar peat swamp in Orange County, New York. J. Torrey Bot. Soc. 124: 89–90. 1997.—The vegetation of the only known remnant of what was once one of the largest inland Atlantic white cedar peat swamp complexes in the world (the Drowned Lands of Orange County, New York) is documented. Although logging and drainage have significantly affected this wetland, a small portion of the cedar swamp has remained somewhat intact. It is the southernmost locality for *Sphagnum contortum* K. F. Schulz, *S. quinquefarium* (Braithw.) Warnst., and *S. wulfianum* Girg. in New York. This community type is critically imperiled in both New York and New Jersey.

Key words: Atlantic white cedar, Drowned Lands, inland Atlantic white cedar peat swamp, larch, peatland, Wallkill River Valley, wetland, *Chamaecyparis thyoides*, *Larix laricina*, *Sphagnum*, *Sphagnum contortum*, *Sphagnum wulfianum*.

A large (about 6880 ha) wetland complex known as the "Drowned Lands" (Eager 1846; Headley 1908) once flourished on the floodplain of the Wallkill River in Orange County, New York (in the Towns of Goshen, Minisink, Warwick, and Wawayanda). It also extended into the Town of Vernon in Sussex County, New Jersey and this portion presently forms the core of the Wallkill River National Wildlife Refuge. These wetlands had developed a thick (1–5 m) organic soil (Carlisle muck: mesic Typic Medisaprists [Olson 1981]) and occurred in the basin of what was once a large proglacial lake (Connally and Sirkin 1970).

Extensive white cedar swamps were one of the more prominent components of the Drowned Lands. Headley (1908) stated that they covered about 15,000 acres (6072 ha), which would have been about 88% of the Drowned Lands area in New York. Although this figure may be an overestimate, it does indicate that white cedar swamps were a significant part of the landscape. As the wood of white cedar was a valuable commodity (being used for construction, fencing, and making onion crates) many farmers in the region owned a wood lot in the Drowned Lands white cedar swamps in the late 1700s and early 1800s.

A number of settlements on small upland areas within the Drowned Lands were established in the 1700s, and at that time most were accessible primarily by boat (Eager 1846). Large scale drainage systems were established in the early 1800s and these lowered the regional water table in order to use the land for "black dirt" agriculture (Bicentennial Commission 1988), and allowed for road construction throughout the drained Drowned Lands region. Even though no longer surrounded by water, many Drowned Lands communities are still referred to as being islands (i.e., Pine Island).

By 1900, most of the natural vegetation of the Drowned Lands had been destroyed. In spite of the extensive drainage and agricultural development that had occurred, a few notable tracts of white cedar still remained at that time. However, even these few remaining white cedar swamps were drained and cleared in the following decades as it became economically viable to exploit more land for agricultural purposes. By the late 1970s it appeared that all of the white cedar swamps had been eliminated and that only a few isolated stands of hardwood swamp, occurring as islands in the midst of an extensive black dirt agricultural region, were all that remained of the once extensive Drowned Lands wetland complex.

Although the Drowned Lands white cedar swamps played a significant role in the history of Orange County, there does not appear to have been any botanical or ecological study of them. This is surprising, because all other major inland

[1] Without the help of Patricia Mconnell, Jack Webster, Alex Kocot, Frances Sodrick, Richard Van Sickle, Steve Urbanski and Tom Pahucki, who all shared their knowledge of the Drowned Lands cedar swamps, this project would have not been possible. The assistance provided by Jeff Hall of the Goshen Public Library and Historical Society is also greatly appreciated. Barbara Thiers identified the liverwort collections and Richard Harris identified the lichen collections. Dick Andrus and Kjell Flatberg helped to identify a few problematic *Sphagnum* specimens.

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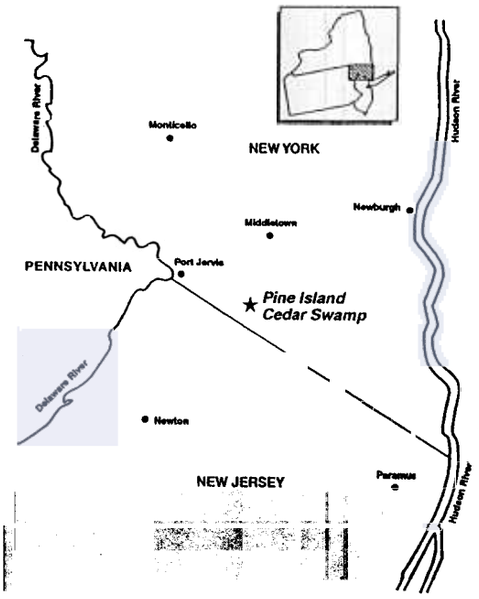

Fig. 1. Map of northern New Jersey and adjacent New York showing the location of the Pine Island Cedar Swamp.

Atlantic white cedar peat swamps in northern New Jersey and adjacent New York have been studied (Niering 1953; Montgomery and Fairbrothers 1963; Sipple 1971–1972; Belling 1977; Lynn 1984; Karlin 1997). There were not even any records indicating whether the cedar was Atlantic white cedar (*Chamaecyparis thyoides*) or northern white cedar (*Thuja occidentalis*). Both species naturally occur in Orange County, but neither the New York State Museum nor the New York Botanical Garden have any herbarium specimens documenting either species from the Drowned Lands.

Given their place in the history of Orange County and the fact that they were once ecologically significant ecosystems, it was imperative that some scientific documentation be made of the Drowned Lands white cedar swamps. With the help of local historians, naturalists, and farmers, I set out to discover what was known about these wetlands. Most of those that I spoke with believed that all of the cedar swamps had been destroyed. Some mentioned that a few cedar trees could still be found in the hardwood swamps associated with the few remaining undeveloped portions of the former Drowned Lands. And, indeed, I did find Atlantic white cedar in two such sites, one near Durlandville (Town of Goshen) and one near Pine Island (Town of Warwick). Much to my surprise, a tiny (about 1 ha) inland Atlantic white cedar peat swamp was also present at the Pine Island site (hereafter referred to as the Pine Island Cedar Swamp). It is surrounded by a hardwood swamp (about 84 ha in extent), which in turn is surrounded by farm fields with extensive drainage systems. Although the Pine Island Cedar Swamp is certainly not undisturbed, a small portion of it (about 0.1 ha) remains relatively intact.

Historical documents show that extensive cedar swamps were once present at both the Pine Island and Durlandville sites (manuscript collection of the Goshen Public Library and Historical Society, Goshen, New York). A map dated 1825 shows four "cedar swamp lots" (about 97 ha in extent) adjoining the parcel of land where the Pine Island Cedar Swamp occurs. Although highly drained black dirt farm fields now occupy the former "cedar swamp lots," local farmers say that cedar swamps still occupied much of the area as recently as 1920 and that the regional water table was much higher back then than it is at the present time. An extensive cedar swamp (about 175 ha) once occurred at the Durlandville site. It was surveyed, mapped and subdivided into 80 lots in the late 1700s by Samuel Gale. About one third of the cedar swamp had "good cedar lots" and the balance had "bad cedar lots." Although no survey data was available for the cedar swamp, there were survey notes from 40 "meadow lots" which were adjacent to the cedar swamp. Four types of trees were listed in this survey (cedar, black ash, maple, and pine), with cedar being named 21 out of the 31 times that trees were cited.

The objective of this study is to provide a quantitative description of the vegetation of the Pine Island Cedar Swamp (Fig. 1), which is the only known remnant of what was once one of the largest inland Atlantic white cedar peat swamp complexes in the world. This community type is now critically imperiled in both New York (Reschke 1990) and New Jersey (Tom Breden 1989).

Methods. A 0.1 ha (20 × 50 m) releve was established in the most intact portion (which was roughly 0.1 ha in extent) of the Pine Island Cedar Swamp. All vascular plant species in the releve were identified and assigned percent ground cover values (by cover classes: 5 = >75% 4 = 50–75%, 3 = 25–50%, 2 = 5–25%, 1 = 1–5%, + = less than 1%, R = much less

Table 1. Plant species occurring in a 0.1 ha plot in the Pine Island Cedar Swamp. Ground cover classes are assigned as follows: 5 = >75%, 4 = 50–75%, 3 = 25–50%, 2 = 5–25%, 1 = 1–5%, + = less than 1%, R = much less than 1%.

	Cover class		Cover class
Sphagnum		**Shrubs**	
Sphagnum affine Ren. & Card.		*Vaccinium corymbosum* L.	5
Sphagnum fimbriatum Wils.		*Acer rubrum* (seedlings & saplings)	4
Sphagnum palustre L.		*Toxicodendron radicans* (L.) Kuntze	2
Sphagnum bartlettianum Warnst.		*Amelanchier canadensis* (L.) Medic.	1
Sphagnum girgensohnii Russ.	+	*Fraxinus nigra* Marsh. (saplings)	+
Sphagnum recurvum P. Beauv.	+	*Lindera benzoin* (L.) Blume	+
Sphagnum wulfianum Girg.	+	*Lyonia ligustrina* (L.) DC.	+
Other Mosses		*Rhododendron viscosum* (L.) Torr.	+
Aulacomnium palustre (Hedw.) Schwaegr.	3	*Rubus pubescens* Raf.	+
Hypnum imponens Hedw.	2	*Toxicodendron vernix* (L.) Kuntze	+
Leucobryum glaucum (Hedw.) Angstr.	2	*Ulmus americana* L. (saplings)	+
Thuidium delicatulum (Hedw.) Schimp.	2	*Chamaecyparis thyoides* (seedings)	R
Tetraphis pellucida Hedw.	2	**Herbaceous Plants**	
Calliergon cordifolia (Hedw.) Kindb.	1	*Coptis trifolia* (L.) Salisb.	2
Dicranum montanum Hedw.	+	*Maianthemum canadense* Desf.	2
Dicranum flagellare Hedw.	+	*Osmunda cinnamomea* L.	1
Leptodictyum riparium (Hedw.) Warnst.	+	*Symplocarpus foetidus* (L.) Salisb. ex Nutt.	1
Climacium americanum Brid.	+	*Thelypteris palustris* Schott	1
Liverworts	R	*Dryopteris carthusiana* (Vill.) Fuchs	1
Bazzania trilobata (L.) S. Gray	+	*Impatiens capensis* Meerb.	+
Jamesoniella autumnalis (D.C.) Steph.	+	*Osmunda regalis* L.	+
Pallavicinia lyellii (Hook.) Carruth.	+	*Onoclea sensibilis* L.	+
Lichens	+	*Parthenocissus quinquefolia* (L.) Planchon.	+
Punctelia subrudecta (Nyl.) Krog	n.a.	*Trientalis borealis* Raf.	+
Lepraria lobificans Nyl.		*Viola macloskeyi* Lloyd	+
Trees		*Aralia nudicaulis* L.	R
Chamaecyparis thyoides (L.) BSP.	5	*Arisaema triphyllum* (L.) Schott ex Schott & Endl.	R
Acer rubrum L.	4	*Gaultheria procumbens* L.	R
Larix laricina (DuRoi) Koch	2	*Clintonia borealis* (Aiton) Raf.	R
	+	*Mitchella repens* L.	R
		Thalictrum sp.	R

* Ground cover values for *Sphagnum affine* and *S. palustre* are combined and listed under *S. affine* because it was not possible to separate these two taxa in the field.

than 1%). Ground cover values for *Sphagnum* and other bryophytes were also determined. Voucher specimens are deposited in the Herbarium of the New York State Museum, Albany, NY and in the Herbarium of Binghamton University, Binghamton, NY. Nomenclature follows Mitchell (1986) for vascular plants, Andrus (1980) for *Sphagnum*, and Anderson et al. (1991) for other mosses. The diameters of all trees having a d.b.h. $\geq$ 2.5 cm were measured in a 250 m^2 subplot. Tree height in the releve was determined with a Suunto clinometer. The age of two Atlantic white cedars was determined by tree cores (taken at 1.4 m above ground level). To avoid harming the living Atlantic white cedar, cores were taken from trees which had recently died. In addition, two standing dead Atlantic white cedar saplings were cut down and their age determined by counting annual growth rings at about 5 cm above the ground. Water samples were collected from the area of the releve in September and November 1995 and February and May 1996. A UniFET FieldLAB-100 pH meter was used to measure pH and specific conductivity (25°C) was measured with a Fisher Model 152 Conductivity Meter. A corrected specific conductivity (K_{corr}) was obtained by adjusting the conducitivity readings for H^+ concentrations (Sjors 1952). Concentrations of Ca^{++} (mg/l) were determined by the EDTA titrimetric method (LaMotte Model PHT-CM-OR).

Results. Table 1 lists the plants found in the 0.1 ha releve. Atlantic white cedar was the dominant tree (basal area = 42.1 m^2/ha; density = 1400 trees/ha; maximum d.b.h. = 39 cm, mean d.b.h. = 18 cm), with red maple (*Acer rubrum*, basal area = 12.8 m^2/ha; density = 920 trees/ha; maximum d.b.h. = 22.5 cm, mean d.b.h. = 12 cm) and larch (*Larix laricina*, basal area =

Table 2. Size class distribution of all trees ≥2.5 cm d.b.h. in a 250 m^2 subplot in the releve at the Pine Island Cedar Swamp.

		d.b.h. (cm)					
Species		<10	10–15	15–20	20–30	30–40	Total
Chamaecyparis thyoides	live	1	11	10			
	dead	20	4	1			
Acer rubrum	live	9	8	2			
	dead	2					

0.5 m^2/ha; density = 10 trees/ha; d.b.h. = 26 cm [only one tree present in the releve]) being the only other trees present (Tables 1, 2). The tallest trees were 20–25 m tall. Live branches on the Atlantic white cedar were limited to the tree canopy, which started about 8–9 m above the ground. Total basal area for the releve was 55 m^2 ha, with over 75% of that being contributed by Atlantic white cedar. Outside of the releve, but within the Pine Island Cedar Swamp, there were two large Atlantic white cedar logs with 50 and 51 cm d.b.h., respectively, indicating that the site had once supported larger trees.

One of the dead trees which was cored had been an understory tree (77 years, 18.5 cm d.b.h., mean annual radial increment of 1.2 mm). The second had been a canopy tree (d.b.h. = 28.9 cm) and unfortunately had a partially rotten interior; only a 8.1 cm core was extracted from this tree (49 years, mean annual radial increment of 1.7 mm). Based upon the above two mean annual radial growth rates, a complete core from this tree would have shown an age of 85–102 years (plus the time it took to grow to 1.4 m) and the largest living Atlantic white cedar present (39 cm d.b.h.) would be 115–163 years old (plus the time it took to grow to 1.4 m). The two dead saplings had had slower growth rates (50 years, 11.4 cm diameter, mean annual radial increment of 1.1 mm; 60 years, 10.0 cm diameter, mean annual radial increment of 0.8 mm) than the two trees which were cored.

Vaccinium corymbosum was the dominant tall shrub and *Toxicodendron radicans* was the most prominent small shrub (Table 1). *Rhododendon viscosum, Lyonia ligustrina, Lindera benzoin, Toxicodendron vernix, Amelanchier canadensis, Ulmus americana,* and *Fraxinus nigra* were also present in the shrub layer, but each had < 1% ground cover. Although red maple seedlings were abundant (5–10% ground cover) in September 1995, especially in the unflooded depressions, most of these were killed when the depressions were refilled with water later in the fall (after the drought ended). Only a few Atlantic white cedar seedlings were observed and all of these occurred on the mounds, well above the normal high water level.

The ground surface was a mosaic of mounds (where the trees and shrubs occur) and depressions which are often filled with water (mound and pool microrelief [Golet et al. 1993]). Large depressions cover 25 to 50% of the ground surface, with mounds (reaching up to 45 cm above the basins of the depressions) making up the balance. The depressions are largely unvegetated and frequently have water in them. Although no standing water was present in mid-September 1995, during an unusually dry period, water (up to 20 cm deep) was present in the depressions when I visited the swamp in November 1995, February 1996 and May 1996. The upper 20 to 30 cm of the mounds was vegetated, with *Sphagnum* (mostly *S. fimbriatum, S. palustre, S. affine,* and *S. bartlettianum*) and *Coptis trifolia* being the dominant plants growing on their surface (Table 1). *Osmunda cinnamomea, Symplocarpus foetidus,* and *Thelypteris palustris* were also prominent, occurring both on the mounds and in the shallower portions of the depressions. *Aulacomnium palustre, Leucobryum glaucum,* and *Thuidium delicatulum* commonly occurred on the mounds and *Hypnum imponens* carpeted the small logs which were elevated above the water level. Liverworts (*Bazzania trilobata, Jamesoniella autumnalis,* and *Pallavicinia lyellii*) were a minor component of the ground layer. *Clintonia borealis* and *Sphagnum wulfianum* were the most noteworthy of the less common species present.

Although not present in the releve, *Rhododendron maximum* L., *Myrica gale* L., *Lycopodium lucidulum* Michx., *Tsuga canadensis* (L.) Carr. (only two trees) and several additional species of *Sphagnum* (*S. contortum* Russ., *S. henryense* Warnst., *S. quinquefarium* [Braithw.] Warnst., *S. russowii* Warnst., and *S. teres* [Schimp.] Angstr.) also occurred in the Pine Island Cedar Swamp or in its immediate vicinity. Larch, although limited to the periphery of the releve, was scattered

throughout the rest of the Pine Island Cedar Swamp. Prominent species in the surrounding hardwood swamp include *A. rubrum, Ulmus americana, Betula alleghanensis* Britt., *Fraxinus nigra, Toxicodendron vernix, Ilex verticellata* L., *Lyonia ligustrina* (L.) DC., *Osmunda cinnamomea, Symplocarpus foetidus*, and *Impatiens capensis*.

Having a dolomite bedrock system, the Pine Island Cedar Swamp has a more minerotrophic environment than that typically associated Atlantic white cedar wetlands (Laderman 1989). It has a moderately to mildly acid (pH 4.7–5.9) and a moderately to strongly minerotrophic (10–40 mg/l Ca^{++}, K_{corr} = 50–200 μmhos/cm) water regime. Although the pH did not vary much over time, Ca^{++} concentrations and conductivity did vary significantly, with less mineralized conditions occurring after heavy rainfall and after periods of extensive snow melt.

THE DURLANDVILLE HARDWOOD SWAMP. Some 20 mature Atlantic white cedar (maximum d.b.h. = 43 cm) still persist scattered throughout the 25 ha hardwood swamp at Durlandville. Although no regeneration of Atlantic white cedar was observed in the forest interior, there were two small clearings along the perimeter of the hardwood swamp where Atlantic white cedar seedlings and saplings were present. One of these was about 0.2 ha in extent and had been cleared about 15 years ago. An extensive carpet of *Sphagnum* (*S. fimbriatum, S. henryense, S. palustre, S. recurvum*, and, a species not found at the Pine Island Cedar Swamp, *S. magellanicum* Brid.) covered the ground and a sward of Atlantic white cedar seedlings and saplings (up to 3 m tall, many having cones) occurred in the southern third of the clearing. In strong contrast, there were no Atlantic white cedar seedlings and saplings in the adjacent hardwood forest and *Sphagnum* had a very limited presence there. Although *Sphagnum* and Atlantic white cedar were quite prominent at the present time, other plant species typical of inland Atlantic white cedar peat swamps were notably absent. Water samples collected from this site in mid-November 1995 had a water chemistry (pH 4.5–4.7, 35–40 mg/l Ca^{++}, K_{corr} = 180–190 μmhos/cm) similar to the that of the Pine Island Cedar Swamp sampled in the same time period (pH 4.7–4.9, 27–40 mg/l Ca^{++}, K_{corr} = 155–200 μmhos/cm).

When this site was cleared, the uprooted trees had been placed in piles in the middle of the clearing. As many of these were Atlantic white cedar, this particular area may have been a small cedar swamp. Unfortunately, whatever the ecosystem might have been, it has been largely obliterated. Only one mature Atlantic white cedar (about 30 cm d.b.h.) had been left standing at this site (it died in late 1995), and it was undoubtedly the primary seed source for the current generation of saplings and seedlings. Although the clearing is subjected to moderate drainage, it has remained wet enough (water table ≤30 cm) to support a good growth of *Sphagnum* and this in turn has provided an excellent environment for the reproduction of Atlantic white cedar. If protected from further drainage and clearing, it would be a prime place to mount a cedar swamp restoration project.

Discussion. Although the Pine Island Cedar Swamp presently occupies about 1 ha, it was once far more extensive. Evidence of Atlantic white cedar (stumps, snags and logs) occurs throughout much of the adjacent hardwood swamp. A few mature Atlantic white cedar and larch still sporadically occur in the hardwood swamp as well. The presence of larch, which is a shade intolerant species, indicates that the original cedar swamp must have had some areas with a fairly open tree canopy. However, there is no evidence of recent successful reproduction by larch. The smallest larch observed had a 14 cm and most had a d.b.h. >20 cm (maximum d.b.h. = 40 cm).

The best preserved portion of the Pine Island Cedar Swamp (covering about 0.1 ha) is also the wettest part of the entire swamp complex. It is the only area where Atlantic white cedar is the dominant tree species and there is no evidence that it has ever been logged. As one moves away from the core area of the Pine Island Cedar Swamp, hardwoods become more dominant and Atlantic white cedar (as well as the other cedar swamp plant species) gradually drop out. Indeed, many of the plants associated with the cedar swamp do not occur, or have a very limited presence, in the hardwood swamp. Because of this, and also because of the presence of a well developed mound and pool microrelief, the Pine Island Cedar Swamp is quite distinct from the surrounding hardwood swamp.

The mean annual radial increments of the Atlantic white cedar are comparable to those found in other Atlantic white cedar swamps in the northeastern United States (Golet and Lowry 1987). The relatively robust growth rate of the one canopy layer tree which was measured (1.7

mm mean annual radial increment) indicates that lack of light, and not high water levels, is the major reason for the reduced growth rates of the subcanopy Atlantic white cedar (0.8 to 1.1 mm mean annual radial increment). The long period of suppressed growth evidenced by the subcanopy Atlantic white cedar further indicates that there has been a relatively dense tree canopy associated with the core area of the cedar swamp for at least the past 50 years.

The tree data indicate that the core of the cedar swamp is in a state of flux (Table 2). Although Atlantic white cedar was once well represented by individuals in all age groups in the releve, indicating that a more open tree canopy existed, and/or that the increased exposure to light that resulted from the logging of the surrounding cedar swamp had allowed for a brief period of successful establishment, regeneration is now minimal. Live Atlantic white cedar saplings <10 cm d.b.h. are notably absent. A large number of dead saplings do occur in the core area, some recently dead and others having been dead for quite some time. Most, if not all, of these were established more than 50 years ago. Only a few Atlantic white cedar seedlings were observed and none of them appeared to be more than a few years old. As Atlantic white cedar seedlings may survive for up to three years under a mature cedar canopy (Laderman 1989; Little and Garrett 1990), these seedlings simply represent short term establishment. White tail deer are present in the hardwood swamp, but there was no evidence that their browsing activities were significantly affecting Atlantic white cedar regeneration. In strong contrast to Atlantic white cedar, there were thousands of red maple seedlings in the releve, and this species was well represented in the sapling to young tree size classes (Table 2). Red maple, which has faster growth rates and is shade tolerant, can displace Atlantic white cedar if no perturbations prevent it from doing so (Carter 1987; Day 1987; Roman et al. 1987). Thus if current trends continue, red maple will become the dominant species and Atlantic white cedar and larch, both shade intolerant species, will decline and perhaps even be extirpated.

DISTURBANCE HISTORY OF THE PINE ISLAND CEDAR SWAMP. The two major perturbations which have affected the Pine Island Cedar Swamp are long term drainage and logging. Extensive drainage systems have been in place throughout the former Drowned Lands region for well over 150 years, and these have lowered the regional water table. An abandoned (and now peat filled) drainage ditch runs through the eastern edge of the Pine Island Cedar Swamp, providing graphic evidence of drainage activity. As the Pine Island Cedar Swamp occurs in the midst of a large wooded lot which has never been utilized for farming, the local water table associated with it has not drawn down as much as it has been in the surrounding, highly drained farm fields. However, the local water table was lowered enough to affect the sustainability of much of the former cedar swamp and this, combined with the extensive logging which occurred there, resulted in the development of a hardwood swamp in its place. Water levels high enough to maintain a cedar swamp environment only occurred in the lowest lying portion of the Pine Island Cedar Swamp, a small area which for some reason was also not logged.

In addition to drainage, Atlantic white cedar was intensively harvested from the Pine Island Cedar Swamp from the 1930s to the early 1950s. Well over a hundred (perhaps several hundred) Atlantic white cedar, averaging 30 cm d.b.h., were harvested each winter and used to make onion crates by Jess Van Sickle (Richard Van Sickle and Frances Sodrick, pers. comm.). The historian for Pine Island (Frances Sodrick) has a photograph of the saw mill which processed the harvested cedar logs, several of which are visible in the picture. One local farmer remembered that cedar having ≥60 cm d.b.h. had been taken from the Pine Island Cedar Swamp. In addition to taking live trees, even the large cedar logs, which are a common component of cedar swamps, appear to have been removed. Because they are resistant to decay and provide useful wood, it was a common practice in the Drowned Lands to harvest cedar logs as well as the living trees.

Although not itself logged, the small core area of the Pine Island Cedar Swamp would have been significantly affected by logging. What was once a protected interior portion, of a cedar swamp became an "edge environment" after logging. Until the surrounding area became reforested, the core area of the Pine Island Cedar Swamp would have experienced increased temperatures, more exposure to light, lower humidity levels, and more air movement. Given its small size and the limited tolerance of many of its component species, this change in microclimate would have been quite significant.

Although anthropogenic nutrient enrichment has been found to significantly affect the species

composition and structure of coastal Atlantic white cedar peatlands (Ehrenfeld 1983), it is not a major variable in the case of the Pine Island Cedar Swamp. Even though surrounded by an extensive agricultural region, water is drained from the swamp and the adjacent agricultural fields by well developed drainage systems (drainage ditches are up to 2 m deep). Thus the influx of nutrient enriched waters from agricultural fields into the cedar swamp is not likely. The absence of significant nutrient enrichment is one reason why the core of the Pine Island Cedar Swamp has remained relatively intact.

COMPARISON WITH OTHER INLAND ATLANTIC WHITE CEDAR PEAT SWAMPS. Only a handful of inland Atlantic white cedar peat swamps are now found in northern New Jersey and adjacent portions of New York (Karlin 1997). Although the Pine Island Cedar Swamp has much in common with these peatlands, it is also quite distinct from them. While it occurs at a low elevation (119 m above sea level) in the broad floodplain of the Wallkill River, all of the other extant inland Atlantic white cedar peat swamps in this region occur in isolated upland areas (elevations ranging from 216 to 454 m above sea level) which include the highest elevation of occurrence for Atlantic white cedar (Laderman 1989). Most are associated with strongly acid (pH 3.5–4.7) and weakly to moderately minerotrophic (<5 mg/l Ca^{++}; K_{corr} ≤40 μmhos/cm) water regimes. Only one other inland Atlantic white cedar peatland in this region (McAfee Swamp) is associated with a moderately to mildly acid (pH 4.6–6.1) and moderately to strongly minerotrophic (5 to 30 mg/l Ca^{++}; K_{corr} 40–210 μmhos/cm) water regime (Karlin 1997). The water chemistry is variable at the latter site (as it also is at the Pine Island Cedar Swamp), with moderately minerotrophic conditions occurring right after heavy rains and during periods of extensive snow melt and strongly minerotrophic conditions being present at other times. Although the ranges overlap, the maximum Ca^{++} concentrations at McAfee Swamp are lower than those at the Pine Island Cedar Swamp.

Several of the plant species present at the Pine Island Cedar Swamp, notably three *Sphagnum* species (*S. contortum, S. teres, S. wulfianum*) and *Ulmus americana,* are not found at any of the other inland Atlantic white cedar peat swamps in this region, including McAfee Swamp. Indeed, there does not appear to be any previous report of the three *Sphagnum* species associated with Atlantic white cedar in any other region. All four species are usually associated with moderately to strongly minerotrophic environments and, with the exception of *Sphagnum wulfianum*, all occur in the fens and rich fens of northern New Jersey (Karlin and Andrus 1988; Karlin 1997). Although clearly belonging to the acid peatland complex of Karlin (1997), the vegetation of the Pine Island Cedar Swamp represents a unique transitional position between the acid peatland complex and the rich fen complex.

In addition, there are several species which are typically found in inland Atlantic white cedar peat swamps which are not present at the Pine Island Cedar Swamp. These include *Calla palustris* L., *Carex trisperma* Dewey, *Drosera rotundifolia* L., *Nyssa sylvatica* Marsh., *Picea mariana* [Mill.] BSP., and *Sarracenia purpurea* L. (Niering 1953; Montgomery and Fairbrothers 1963; Belling 1977; Lynn 1984; Karlin 1997). These species probably did occur in the extensive cedar swamps which once covered much of the Drowned Lands, but all appear to have been extirpated. For instance, one local natural historian (Jack Webster, pers. comm.) believes that *Picea* (*P. mariana* and/or *P. rubens*) was once found in the Drowned Lands cedar swamps. The absence of these species from the Pine Island Cedar Swamp is most probably due to the extensive perturbation that the swamp has experienced, its small size, and its isolation from other similar peatlands. Ehrenfeld (1983) found that 25% of the plant species occurring in pristine swamps in the New Jersey Pine Barrens were not found in swamps in developed areas which had been subjected to changes in hydrology and water chemistry.

The minimal presence of liverworts is also noteworthy. They are a prominent component of the inland Atlantic white cedar swamps in northern New Jersey and adjacent New York (Reschke 1990; Karlin 1997). Their lack of abundance can be explained in part by the lack of large old logs (most of which were removed when the cedar swamp was logged). The prime liverwort habitat in Atlantic white cedar swamps is on large, old logs which are partially immersed in the peat. There were several small logs in the cedar swamp, but most were elevated well above the ground surface and largely covered by *Hypnum imponens*, not by liverworts. The change in microclimate associated with logging (see above) is another significant variable, with liverwort populations declining or being extirpated be-

cause of the increased exposure to light, wind, and lower humidity levels.

Conclusion. The present day vegetation of the Pine Island Cedar Swamp does not fully represent what the vegetation of the Drowned Lands cedar swamps once was. It is only one small, isolated site and its species composition and ecological relationships have been significantly altered by human activities. As noted above, several species which commonly occur in inland Atlantic white cedar swamps have probably been extirpated. In addition, several species which are not usually associated with pristine inland Atlantic white cedar peat swamps (*Lindera benzoin, Impatiens capensis, Onoclea sensibilis, Parthenocissus quinquefolia, Ulmus americana*) occur there. Although this latter group of species is still not common in the core area of the Pine Island Cedar Swamp (where the releve was located), they are prominent components of the surrounding hardwood swamp and those portions of the Pine Island Cedar Swamp which grade into the hardwood swamp.

In spite of the changes noted above, the inner core of the Pine Island Cedar Swamp remains remarkably intact. Atlantic white cedar remains dominant, the mound and pool microrelief is well developed, and several plant species typical of inland Atlantic white cedar peat swamps still occur there. Among the more noteworthy remnants would be the *Sphagnum* flora, which is relatively diverse (12 species), especially considering the perturbations that have taken place. This is somewhat surprising, because *Sphagnum* species are often quite sensitive to changing environments. The fact that anthropogenic nutrient enrichment has been minimal at this site is probably a major reason why the *Sphagnum* flora has been so well maintained. *Sphagnum contortum, S. quinquefarium,* and *S. wulfianum* are new records for Orange County and the site represents their southernmost occurrence in New York (Andrus 1980). It is also the lowest elevation (about 119 m) that *S. wulfianum* is known from in the southern part of its range. In addition, the presence of *S. contortum, S. teres,* and *S. wulfianum* is unique for Atlantic white cedar peat swamps. The richness of the present *Sphagnum* flora, which is probably just a small remnant, and the presence of one additional species (*S. magellanicum*) at the Durlandville site suggests that the Drowned Lands once had a robust and diverse assemblage of *Sphagnum*.

Although the Pine Island Cedar Swamp has persisted until the present, the environmental regime which has allowed for its preservation has not remained static. Unfortunately, the changes that have occurred do not enhance its sustainability. The hardwood swamp which replaced the logged portions of the cedar swamp is maturing and creating an environment increasingly unsuitable for the regeneration of Atlantic white cedar, larch and most of the other plant species associated with the cedar swamp. Thus the area where these species can survive is becoming more limited with time. Secondly, a 25 ha portion of the hardwood swamp was cleared and converted to agricultural land within the past 25 years and there is a chance that even more will be lost in the near future (80 ha have been converted to agricultural land at the Durlandville site in the same time period). This progressive loss of the surrounding hardwood swamp means a decreasing buffer for the Pine Island Cedar Swamp, especially in terms of maintaining a locally elevated water table. Finally, a more efficient drainage system has been installed in adjacent agricultural fields within the past 10 years (Steve Urbanski, pers. comm.), and this most likely has had an impact on the water table of the Pine Island Cedar Swamp.

As has already been amply demonstrated in the former areas of the Pine Island Cedar Swamp now occupied by hardwood swamp, and, indeed, at all of the sites where extensive cedar swamps once existed in the Drowned Lands, the majority of species associated with the Pine Island Cedar Swamp will be extirpated if the ecosystem which provides the environment essential for their survival declines and ultimately disappears. However, simply protecting the Pine Island Cedar Swamp from development at this point of time may not be sufficient to ensure its continued existence; some additional level of management may also be required. If nothing is done, then the sole remnant of the once extensive Drowned Lands cedar swamps is truly making its last stand.

Literature Cited

ANDERSON, L. E., H. A. CRUM, AND W. R. BUCK. 1990. List of the mosses of North America north of Mexico. Bryologist 93: 448–499.

ANDRUS, R. E. 1980. Sphagnaceae of New York State. New York State Mus. Bull. No 442, Albany, New York. 89 p.

BELLING. A. J. 1977. Postglacial migration of *Chamaecyparis thyoides* (L.) B.S.P. (southern white cedar) in the northeastern United States. Ph.D. Dissertation. New York University, New York.

BICENTENNIAL COMMISSION. 1988. Minisink: A bicentennial history. Town of Minisink, Orange County, New York. 339 p.

BREDEN, T. F. 1989. A preliminary natural community classification for New Jersey, p. 157–191. *In* E. F. Karlin [ed.], New Jersey's Rare and Endangered Plants and Animals. Institute for Environmental Studies, Ramapo College of New Jersey, Mahwah, New Jersey. 243 p.

CARTER, A. P. 1987. Cedar restoration in the Dismal Swamp of Virginia and North Carolina, p. 323–325. *In* A. D. Laderman [ed.], Atlantic white cedar wetlands. Westview Press, Boulder, Colorado. 401 p.

CONNALLY, G. G. AND L. A. SIRKIN. 1970. Late glacial history of the Upper Wallkill Valley, New York. Geol. Soc. America Bull. 81: 3297–3305.

DAY, F. P. 1987. Production and decay in a *Chamaecyparis thyoides* swamp in southeast Virginia, p. 123–132. *In* A. D. Laderman [ed.], Atlantic white cedar wetlands. Westview Press, Boulder, Colorado. 401 p.

EAGER, S. W. 1846. An outline history of Orange County. S. T. Callahan, Newburgh, New York. 652 p.

EHRENFELD, J. G. 1983. The effects of changes in land-use on swamps of the New Jersey Pine Barrens. Biological Conservation 25: 353–375.

GOLET, F. C. AND D. J. LOWERY. 1987. Water regimes and tree growth in Rhode Island Atlantic white cedar swamps, p. 91–110. *In* A. D. Laderman [ed.], Atlantic white cedar wetlands. Westview Press, Boulder, Colorado. 401 p.

HEADLEY, R. 1908. The history of Orange County, New York. Van Deusen and Elms, Middletown, New York. 1997 p.

KARLIN, E. F. 1997. Ecology of the conifer peatlands of northern New Jersey. *In* S. K. Majumdar, E. W. Miller, and F. J. Brenner [eds.], Ecology of wetlands and associated systems. Pennsylvania Academy of Science, Easton, Pennsylvania. (In press)

——— AND R. E. ANDRUS. The *Sphagnum* species of New Jersey. Bull. Torrey Bot. Club 115: 168–195.

LADERMAN, A. D. 1989. The ecology of Atlantic white cedar wetlands: A community profile. U.S. Fish and Wildlife Service Biological Report 85(7.21). 114 p.

LITTLE, S. AND P. W. GARRETT. 1990. *Chamaecyparis thyoides* (L.) B.S.P. Atlantic white cedar, p. 103–108. *In* Burns, R. M. and B. H. Honkala [tech. coords.], Silvics of North America: 1. Conifers. Ag. Handbook 654. U.S.D.A., Forest Service, Washington, DC. Vol. 1. 675 p.

LYNN, L. M. 1984. The vegetation of Little Cedar Bog, southeastern New York. Bull. Torrey Bot. Club 111: 90–95.

MITCHELL, R. S. 1986. Checklist of the vascular plants of New York State. New York State Mus. Bull. No. 458. Albany, New York. 272 p.

MONTGOMERY, J. D. AND D. E. FAIRBROTHERS. 1963. A floristic comparison of two sphagnous wetlands in New Jersey. Bull. Torrey Bot. Club 90: 87–99.

NIERING, W. A. 1953. The past and present vegetation of High Point State Park, New Jersey. Ecol. Monogr. 23: 127–148.

OLSON, K. S. 1981. Soil Survey of Orange County, New York. United States Department of Agriculture, Soil Conservation Service. 192 p.

RESCHKE, C. 1990. Ecological communities of New York State. Latham, New York: New York Natural Heritage Program/New York Department of Environmental Conservation. 96 p.

ROMAN, C. T., R. E. GOOD AND S. LITTLE. 1987. Atlantic white cedar swamps of the New Jersey Pine Barrens, p. 35–40. *In* A. D. Laderman [ed.], Atlantic white cedar wetlands. Westview Press, Boulder, Colorado. 401 p.

SIPPLE, W. S. 1971–72. The past and present flora and vegetation of the Hackensack Meadows. Bartonia 41: 4–56.

SJÖRS, H. 1952. On the relations between vegetation and electrolytes in north Swedish mire waters. Oikos 2: 241–258.

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WALLKILL RIVER TASK FORCE
A project of the Orange County Land Trust
PO Box 2442, Middletown, NY 10940 (845) 343-0840 oclt@warwick.net

March 12, 2002

Heidi Firstenfel
Army Corps of Engineers
Department of the Army
Regulatory Branch
1 Bond St.
Troy NY 12180

Dear Ms. Firstenfel:

RE: Possible land purchases in the Black Dirt area, Orange County

As per our recent discussion I am enclosing a tax map of the Pine Island area, with ecologically valuable lands highlighted in yellow.

We recommend any or all of these areas for acquisition. The farm of Alex Kocot on Big Island Rd. (triangular parcel) supports a white cedar swamp, a valuable but dwindling habitat type in this area. The others are wetlands: biological inventories in the area reveal that many of these are currently excellent wildlife habitat, too wet to farm or build on; others could likely be developed into habitat-rich wetlands with minimal restoration management. The fact that these wetlands (formerly the original Wallkill River streambed) are spatially linked is exciting because protecting them would enable us to begin to protect a corridor of connected habitat sites.

We hope this provides you with the information you need. Please let us know if there is anything else we can do to move this important initiative forward.

Sincerely,

Ann Botshon

Cc: John Gebhards, Orange County Land Trust


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March 14, 2002

George Stafford
New York State Department of State
Division of Coastal Resources and
Waterfront Revitalization
41 State Street
Albany, New York 12231-0001

Millennium Pipeline Company, L.P
F-2001-0246 (formerly F-98-0173)

Dear George:

On behalf of Millennium Pipeline Company, L.P. ("Millennium"), we are responding to the February 19, 2002 letter (hereinafter the "K&E Letter") that was submitted to Mr. Steven C. Resler of the Department of State ("DOS") by the law firm of Kirkland & Ellis. Kirkland and Ellis, as you are aware, has been retained by the Village of Croton-on-Hudson to oppose the Millennium Pipeline Project in various agency proceedings. For the reasons set forth below, there is utterly no basis for any of Kirkland & Ellis' contentions about the potential effects of any limited blasting that may be required to construct the Millennium pipeline near the eastern shore of the Hudson River.

Initially, Kirkland & Ellis' assertion that Millennium has tried to conceal the potential need for a limited amount of blasting in the Hudson River is plainly untrue. Indeed, Kirkland & Ellis concedes in its letter that Millennium disclosed the potential need for blasting in the Hudson River "nearly four years ago" at the very beginning of the regulatory review process

and reconfirmed the potential need for blasting near the eastern shore of the river in an October 2001 submission to the U.S. Army Corps of Engineers (K&E Letter at 2). Millennium, nevertheless, recognizes that the possible need for a limited amount of blasting in the Hudson River was not addressed until recently in Millennium's submissions to the DOS, regrets that oversight, and renews its commitment to provide the DOS with full and complete information on all aspects of the Millennium Project that are subject to review by the DOS.[1]

Kirkland & Ellis also tries in vain (K&E Letter at 5) to contest Millennium's representations that the FERC has confirmed the consistency of the Millennium Project with the New York Coastal Management Program ("CMP") in several important respects. However, Kirkland & Ellis does not and could not deny that the FERC's December 19, 2001 order approving the Millennium Project addressed the key CMP issue of the public need for the Project, concluding that "the benefits of Millennium's proposed project are clear and significant." *Millennium Pipeline Co.*, 97 FERC ¶ 61,292 at 62,321 (2001). Moreover, Kirkland & Ellis' contention (K&E Letter at 5) that the FERC's Final Environmental Impact Statement ("FEIS") "fails to apply or otherwise make any reference" to CMP Policy 7 (the "significant habitat" criteria) is patently false. As the FEIS plainly and unmistakably concludes: "Consistency with Policy 7 is summarized below and discussed in greater detail in appendix J and the EFH Assessment and BA issued January 2001." FEIS at 5-132; see also FEIS at 5-70.

Millennium recognizes that the DOS must ultimately decide the consistency of the Millennium Project with the CMP policies, but the FERC's consistency determinations should obviously be accorded significant weight given that the FERC is the federal agency charged with the duty to determine the need for an interstate gas pipeline and the lead agency under NEPA for the purpose of evaluating the environmental impacts of the proposed project. Deference to the FERC's findings in this instance is particularly appropriate given the DOS's insistence that the FERC provide its analysis of the Project's consistency with CMP policies in the FEIS (See DOS letter to FERC dated October 21, 1999).

Kirkland & Ellis' further allegation that Millennium has understated the effects of any blasting that could be required reflects a profound misunderstanding of the pipeline construction method that Millennium has proposed. Kirkland & Ellis hypothesizes that lay barges would be used to store excavated material but might be unable to access the shallow

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[1] Millennium's willingness to submit further information is subject to its reservation of rights concerning the timing of DOS review as is set forth in prior correspondence and submissions concerning the Millennium Project.

water area near the eastern shoreline, particularly during low tide, thus requiring Millennium to sidecast the excavated material on the riverbed. K&E Letter at 6. In fact, however, Millennium has not proposed to store excavated material on lay barges, which are, as you know, used to lay the pipeline. Instead, Millennium proposes to store the excavated material in separate shallow water storage barges, which will be positioned in the already excavated trench, thus ensuring adequate draft depth. In the event that there is any excavated material that cannot be stored in the shallow water barges, that material will be stored on the shore. In short, no excavated material will be sidecast on the riverbed, contrary to Kirkland & Ellis' conjecture.

In further support of its contention that the effects of blasting have been understated, Kirkland & Ellis claims that Millennium's estimate that blasting may be limited to less than 200 feet was "arbitrary" and surmises that "other buried outcroppings could be encountered." K&E Letter at 7. But Millennium's estimate of the area potentially impacted by blasting is clearly reasonable, based upon the data that has been obtained and submitted to the DOS. In fact, only one of the borings in the Hudson revealed any rock within the depth profile to be excavated. All of the other borings revealed significant sediment depth below the elevation of the proposed excavation refuting Kirkland and Ellis' speculation. In any event, the effects of any blasting would be very limited: Only 0.002% of the designated significant habitat and 0.0008% of the contiguous functional habitat would potentially be affected. A maximum of 260 cubic yards of rock -- just 20% of the total trench volume in this area -- may need to be blasted.

Kirkland & Ellis' claims that blasting would adversely affect aquatic plants, invertebrates, and fish (K&E Letter at 7-10) are premised on selective quotations from the Keevin & Hempen report that describe the potential worst-case effects of uncontrolled, unmitigated underwater blasting. In fact, no aquatic plants are located in the vicinity of the crossing as Millennium's underwater survey confirmed. See Millennium's March 2001 Coastal Zone Consistency Determination, Attachment A-3, Table 3, (confirming that no vegetation was observed in the area). As for potential effects of blasting on invertebrates, Kirkland & Ellis once again demonstrates a misunderstanding of the proposed plan and mitigation concepts. Because the sediments overlying the rock in the potential blast area will be removed first, the bottom area in the immediate vicinity of the blasting will be rendered unsuitable for invertebrates before blasting takes place. This change in habitat conditions would minimize the abundance of invertebrates in the area affected by the blast. Following backfilling of the trench with the excavated rock and the original overlying sediment, the benthic habitat would be rapidly recolonized from the nearby unaffected benthic community. These concepts were discussed at length in Millennium's March

2001 Coastal Zone Consistency Determination at pages 35 and 38-39.

Other technical aspects of Millennium's proposal are worth mentioning, which further underscore Kirkland & Ellis' misunderstanding of Millennium's proposal and misuse of the Keevin and Hempen Report. Blasting would take place in shallow water which minimizes the volume of water potentially affected by the blast, thereby minimizing the numbers of fish which could occupy the area in the vicinity of the blast. The older and larger individuals of many fish species, including the shortnose and Atlantic sturgeon, shad, and striped bass, do not occur in substantial numbers in the shallow, near-shore zone of Haverstraw Bay, which tends to isolate them from blast effects. Moreover, as Keevin and Hempen show in their review of techniques to mitigate the effects of underwater blasting, an air bubble curtain can be very effective in shallow water for minimizing pressure wave effects on fish, with the pressure wave attenuated by over 90% and fish mortality reduced to zero. See Keevin & Hempen Report, Table 8.6 and accompanying text (confirming the efficacy of a bubble curtain at shallow depths: "Mortality fell from 100%, without the bubble curtain, to 0% with the bubble curtain in operation, at all distances tested"). This is to be expected because there is a relatively small volume of water to be enclosed by the air curtain. The near-shore location of the blast does not expose the air bubble curtain to the strong currents of deep, swift water, which has minimized the effectiveness of this mitigation technique in some applications. Since Millennium has proposed to use an air bubble curtain and the area where blasting may be required is shallow, Kirkland and Ellis' concerns, which are based upon impact associated with blasting that is conducted without mitigation, is simply misplaced.

Also, as discussed above, the area of the trench in which blasting may be needed is an extremely small portion of the available habitat in Haverstraw Bay and the adjacent similar habitat. Because the habitat of this area will be temporarily disturbed in preparation for the blast, the density of fish and crabs in the area will be very low. Since blue crabs prefer soft bottom habitat, it is unlikely that they will be attracted to the rocky bottom that will be exposed after the sediment is removed from the area prepared for the blast. The air bubble curtain may also serve to exclude fish and crabs from the area, and the pre-blast sonic surveys will ensure that no concentrations of fish are present at the time of the blast. These conditions and precautions will ensure that only an extremely small portion of any aquatic life population could be potentially impacted by the blast. As such, there is no conceivable way a single, shallow water blast could impact a significant portion of any of these populations. As with the excavation for the pipeline, the blasting effects on aquatic life and habitat will be small and temporary.

Kirkland & Ellis also claim that fish will be attracted to the blast area, thereby increasing adverse impacts from the blast. K&E Letter at 9. While it is true that fish have been attracted to the periphery of dredging operations to take advantage of food dislodged by the dredge, Kirkland & Ellis fail to apply this information to the proposed blast in a meaningful way. As stated clearly in the information provided in previous correspondence to the DOS and the DEC, the soft sediments overlying the rock will be removed first. This will be followed by a period of time to drill the blast holes and prepare for the blast. The turbidity from excavating the soft sediments, which is the mechanism which can attract fish to the area, will have dissipated long before the blast occurs. To the extent that any fish remain on the periphery of the blast area just prior to the blast, they would be isolated from the blast effects by the air bubble curtain.

Lastly, Kirkland & Ellis state that attempts to scare fish from a blast area have been unsuccessful and may cause fish mortality. This is true for the use of small explosive charges to scare fish, but Millennium will not use explosive charges to scare fish. Rather, Millennium will employ electronic noise generating devices to scare fish, if needed. Noise devices have been used extensively in attempts to control fish behavior with varied success, but they do not cause fish mortality.

The rest of Kirkland & Ellis' arguments merit only a summary response. Because Millennium has previously explained in great detail why the Millennium Project is consistent with all applicable CMP policies, we see no need at this point to respond to Kirkland & Ellis' contrary, conclusory opinion. Similarly, Kirkland & Ellis' professed concerns that the September 1 - November 15 window for the river crossing provides insufficient time for rock removal and the development of a blasting plan have no foundation since Millennium's 10-week construction schedule includes the time required for any necessary rock removal activities, and a detailed blasting plan will be reviewed and approved by the federal and state agencies before construction commences.

On the other hand, Millennium cannot leave unchallenged Kirkland & Ellis' last assertion that the Millennium Project is not a "major energy facility" that is entitled to "priority consideration" under CMP Policy 27. K&E Letter at 15-16. To the contrary, the Coastal Zone Management Act ("CZMA") defines "energy facilities" to include facilities which will be used primarily for the "transportation" of "natural gas" (16 U.S.C. Section 1453(6)) and mandates that "priority consideration being given to coastal-dependent uses and orderly processes for siting major facilities relating to...energy..." (Section 1452(2)(D). Policy 27 of the New York CMP implements this statutory requirement, requiring decisions on the siting of major energy facilities to be based upon "public energy need, compatibility of such facilities with the environment, and the facility's need for

MILLENNIUM
PIPELINE

April 8, 2002

Alex Chmielewski
US Fish & Wildlife Service
3817 Luker Road
Cortland, New York 13045

Re: Millennium Pipeline Project

Dear Mr. Chmielewski:

As we recently discussed, attached is an Environmental Construction Drawing depicting "Detail 12" which shows the construction work area and notes to protect bog turtle habitat in Orange County, NY. This drawing is a full size copy of the one you approved in your recent e-mail on this subject. Millennium will include this drawing in the overall construction drawing package for the successful contractor to implement during construction. As part of the coordination under Section 7 of the Endangered Species Act, please provide concurrence that this drawing adequately addresses and completes consultation on this remaining issue.

As always, we remain available to meet with you to discuss this or any other issues you may have.

Very truly yours,

Richard E. Hall, Jr.
MPL Acting Facility Project Manager

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